

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A method comprising:
forming a trench in a substrate;
providing at least one metalized surface along said trench; and
activating ~~applying~~ a bonding ~~surface~~ material having a metalized capping surface to
bond said bonding material to said substrate such that said metalized capping surface is located
over said trench having said at least one metalized surface.
2. (Original) The method of claim 1, wherein said substrate comprises a printed circuit board.
3. (Original) The method of claim 1, wherein said substrate comprises a dielectric material.
4. (Original) The method of claim 3, wherein said trench is formed by selectively removing portions of said dielectric material.
5. (Previously Presented) The method of claim 1, wherein said at least one metalized surface comprises sidewall surfaces and a bottom surface of a waveguide structure.
6. (Currently Amended) The method of claim 1, wherein said metalized capping surface on said bonding ~~surface~~ material is formed by applying a metal coating on said bonding ~~surface~~ material and selectively removing portions of said metal coating such that said metalized capping surface remains on said bonding ~~surface~~ material.

7. (Currently Amended) The method of claim 1, wherein said metalized capping surface on said bonding ~~surface~~ material is formed by providing said bonding ~~surface~~ material and selectively placing said metalized capping surface on said bonding ~~surface~~ material.

8. (Original) The method of claim 1, further comprising filling said trench with a material.

9. (Currently Amended) A method comprising:
forming a trench in a printed circuit board substrate, said trench having a first side surface, a second side surface and a bottom surface;
forming at least one surface on said first side surface, said second side surface and said bottom surface of said trench; ~~and~~
forming a capping surface on a bonding material; and
forming said bonding material as a top surface over said trench having said at least one surface, said top surface being different than said at least one surface.

10. (Currently Amended) The method of claim 9, wherein said at least one surface comprises at least one metalized surface and said top surface comprises a separate top metalized surface, wherein said capping surface is a metalized capping surface.

11. (Original) The method of claim 10, wherein said substrate comprises a dielectric material.

12. (Original) The method of claim 11, wherein said trench is formed by selectively removing portions of said printed circuit board substrate.

13. (Currently Amended) The method of claim 11, wherein forming said separate top metalized surface over said trench comprises affixing a said bonding surface material having a

said metalized capping surface to said printed circuit board substrate by reflowing said bonding material such that said metalized capping surface forms a cap aligned over said trench.

14. (Currently Amended) The method of claim 13, wherein said ~~separate-top~~ metalized capping surface on said bonding ~~surface~~ material is formed by applying a metal coating on said bonding ~~surface~~ material and selectively removing portions of said metal coating such that said ~~separate-top~~ metalized capping surface remains on said bonding ~~surface~~ material.

15. (Currently Amended) The method of claim 13, wherein said ~~separate-top~~ metalized capping surface on said bonding ~~surface~~ material is formed by providing said bonding ~~surface~~ material and selectively aligning said ~~top~~ metalized capping surface on said bonding ~~surface~~ material.

16. (Original) The method of claim 9, further comprising filling said trench with a material.

17. (Currently Amended) A method comprising:
forming a trench in a printed circuit board; and
forming a waveguide structure in said trench of said printed circuit board by ~~providing at least one metalized surface along said trench, and~~ bonding a bonding ~~surface~~ material having a metalized capping surface to said printed circuit board such that said metalized capping surface is located over said trench ~~having said at least one metalized surface so as to form said~~ waveguide structure.

18. (Currently Amended) The method of claim 17, wherein the method further includes metalizing walls of said trench ~~comprises a first sidewall, a second sidewall and a bottom wall.~~

19. (Currently Amended) The method of claim 18, wherein bonding said bonding material includes heating said bonding material to affix said bonding material to said printed circuit board ~~said waveguide structure comprises said at least one metalized surface on said first sidewall, said second sidewall and said bottom wall and said metalized capping surface on a top of said trench.~~

20. (Canceled)

21. (Original) The method of claim 17, further comprising filling said trench with a material.

22. (Currently Amended) A structure comprising:
a printed circuit board; and
~~bonding material provided on at least one surface of said printed circuit board; and~~
a waveguide structure provided within said printed circuit board, said waveguide structure including:
a trench within said printed circuit board; and
a bonding material having a capping surface on at least a portion of said bonding material, the bonding material disposed on top of said trench with said capping surface aligned over said trench.

23. (Currently Amended) The structure of claim 22, wherein said ~~printed circuit board comprises a trench~~ is formed within said printed circuit board between a top surface of said printed circuit board and a bottom surface of said printed circuit board.

24. (Currently Amended) The structure of claim ~~23~~ 22, wherein said ~~trench~~ comprises a first sidewall, a second sidewall and a bottom wall waveguide structure includes material for walls of said waveguide structure such that said walls have reflective surfaces to enable guiding signals through said waveguide structure.

25. (Currently Amended) The structure of claim 24, wherein said waveguide structure comprises at least one metalized surface on ~~said a~~ first sidewall, ~~said a~~ second sidewall and ~~said a~~ bottom wall and said capping surface is a metalized capping surface ~~on a top of said trench and adjacent said bonding material.~~

26. (Original) The structure of claim 23, wherein said trench is filled with a material.

27. (Previously Presented) The structure of claim 25, wherein the metalized capping surface is substantially aligned only over the trench.

28. (Previously Presented) The structure of claim 22, wherein the bonding material comprises one of an epoxy and an adhesive.

29. (Currently Amended) The structure of claim 1, wherein ~~applying~~ activating the bonding ~~surface comprises~~ material includes applying the bonding ~~surface~~ material such that the metalized capping surface is substantially aligned only over the trench.

30. (Currently Amended) The method of claim 1, wherein the bonding ~~surface~~ material includes ~~a bonding material comprising~~ one of an epoxy and an adhesive.

31. (Currently Amended) The method of claim 10, wherein ~~the separate top~~ said metalized capping surface of said bonding material is substantially aligned only over the trench.

32. (Currently Amended) The method of claim 13, wherein ~~the bonding surface~~ includes a said bonding material comprising one of an epoxy and an adhesive.

33. (Currently Amended) The method of claim 17, wherein ~~the metalized bonding~~ said metalized capping surface is substantially aligned only over the trench.

AMENDMENT AND RESPONSE UNDER 37 CFR 1.116 – EXPEDITED PROCEDURE

Serial Number: 09/963637

Filing Date: September 27, 2001

Title: WAVEGUIDE IN A PRINTED CIRCUIT BOARD AND METHOD OF FORMING THE SAME

Assignee: Intel Corporation

Page 7

Dkt: 884.A23US1 (INTEL)

34. (Currently Amended) The method of claim 17, wherein ~~the said bonding surface~~ includes a bonding material comprising comprises one of an epoxy and an adhesive.

REMARKS

Applicant has reviewed and considered the Office Action mailed on August 13, 2003, and the references cited therewith.

Claims 1, 6, 7, 9, 10, 13-15, 17-19, 22-25, 29-34 are amended, no claims are canceled, and no claims are added; as a result, claims 1-19, and 21-34 are now pending in this application. The amendments to the claims are fully supported by the specification as originally filed. No new matter is introduced. The amendments are made to clarify the claims. Applicant respectfully requests reconsideration of the above-identified application in view of the amendments above and the remarks that follow.

Applicant believes that the proposed amendments to these claims will place them in condition for allowance.

Support for claim 1 is found in the specification, for example, on page 8, lines 15-18.

Support for claim 9 and dependent claim 10 is found in the specification, for example, on page 7, lines 12-17.

Support for dependent claim 13 is found in the specification for example, on page 8, lines 15-18.

Support for claim 17 is found in the specification, for example, on page 5, lines 6-14.

Support for dependent claim 18 is found in the specification, for example, on page 6, lines 19-20.

Support for dependent claim 19 is found in the specification, for example, on page 9, lines 9-10.

Support for claim 22 is found in the specification, for example, on page 7, lines 12-20.

Support for dependent claim 24 is found in the specification, for example, on page 9, lines 16-17.

Claims 6, 7, 14, 15, 23, 25, and 29-34 are amended in line with amended language of the claims from which these claims depend.

Information Disclosure Statement

Applicant respectfully requests that a copy of the 1449 Form that was submitted with the Information Disclosure Statement filed on 27 September 2001 with the original patent application, listing all references marked as being considered and initialed by the Examiner, be returned with the next official communication.

§102 Rejection of the Claims

Claims 1 and 3-7 were rejected under 35 USC § 102(b) as being anticipated by Collins et al. ("Technique for micro-machining millimeter-wave rectangular waveguide", Electronic Letters, vol. 34, pp. 996-997 (May 14 1998)). Applicant traverses these grounds for rejection.

Applicant can not find in Collins et al. (hereafter Collins) a teaching or suggestion of activating bonding material that has a metalized capping surface to bond the bonding material to a substrate with the metalized capping surface over a trench in the substrate as recited in claim 1, as amended. Collins deals with micro-machining a waveguide that includes attaching a pre-sputtered lid to complete the waveguide. Attaching a pre-sputtered lid to complete a waveguide is distinctly different than activating bonding material having a metalized capping surface to bond to a substrate. Applicant respectfully submits that an article to be bonded is not per se a bonding material. Thus, Applicant submits that Collins does not teach or suggest all the elements as arranged in claim 1 and that Collins does not anticipate claim 1.

Claims 3-7 depend on claim 1 and are patentable over Collins for the reasons stated above and additionally in view of the further elements recited in these dependent claims.

Applicant requests withdrawal of these rejections to claims 1 and 3-7, and reconsideration and allowance of these claims.

§103 Rejection of the Claims

Claims 2, 8-19 and 21-34 were rejected under 35 USC § 103(a) as being unpatentable over Collins et al. in view of Kronz et al. (U.S. 6,185,354). Applicant traverses these grounds for rejection.

Applicant can not find in Kronz et al. (hereafter Kronz) a teaching or suggestion of activating bonding material that has a metalized capping surface to bond the bonding material to a substrate with the metalized capping surface over a trench in the substrate as recited in claim 1, as amended. Kronz appears to deal with a printed circuit board having an integral waveguide having a metallic plate that provides the top of the waveguide that is formed directly to the waveguide channels. *See Kronz, column 4, lines 24-29.* Thus, Applicant submits that Kronz does not cure the abovementioned deficiencies of Collins with respect to claim 1. Further, Applicant submits that Collins in view of Kronz does not teach or suggest all the elements as recited in claim 1 and does not establish a proper *prima facie* case of obviousness. Since claims 2, 8, 29, and 30 depend on claim 1, claims 2, 8, 29, and 30 are patentable over Collins in view of Kronz for the reasons stated above and additionally in view of the further elements recited in these dependent claims.

Applicant can not find in Collins a teaching or suggestion of bonding a capping surface to a bonding material and forming the bonding material as a top to a trench formed in a printed circuit board as recited in claim 9, as amended. Collins deals with micro-machining a waveguide that includes attaching a pre-sputtered lid to complete the waveguide. Attaching a pre-sputtered lid does not teach or suggest forming bonding material as a cap to a trench in a printed circuit board.

In addition, Applicant can not find in Kronz a teaching or suggestion of bonding a capping surface to a bonding material and forming the bonding material as a top to a trench formed in a printed circuit board as recited in amended claim 9. As noted above, Kronz appears to deal with a printed circuit board having an integral waveguide having a metallic plate that provides the top of the waveguide that is formed directly to the waveguide channels. *See Kronz, column 4, lines 24-29.* Therefore, Applicant submits that Kronz does not cure the abovementioned deficiencies of Collins with respect to claim 9. Thus, Applicant submits that Collins in view of Kronz does not teach or suggest all the elements as recited in claim 9 and does not establish a proper *prima facie* case of obviousness.

Claims 10-16, 31, and 32 depend on claim 9 and are patentable over Collins in view of Kronz for the reasons stated above and additionally in view of the further elements recited in these dependent claims.

Applicant can not find in Collins a teaching or suggestion of forming a waveguide structure in a trench of a printed circuit board by bonding a bonding material having a metalized capping surface to the printed circuit board such that the metalized capping surface is located over the trench as recited in claim 17, as amended. Collins deals with micro-machining a waveguide that includes attaching a pre-sputtered lid to complete the waveguide. Attaching a pre-sputtered lid does not teach or suggest bonding a bonding material having a metalized capping surface to the printed circuit board such that the metalized capping surface is located over the trench to form a waveguide structure.

Further, Applicant can not find in Kronz a teaching or suggestion of forming a waveguide structure in a trench of a printed circuit board by bonding a bonding material having a metalized capping surface to the printed circuit board such that the metalized capping surface is located over the trench as recited in amended claim 17. As noted above, Kronz appears to deal with a printed circuit board having an integral waveguide having a metallic plate that provides the top of the waveguide that is formed directly to the waveguide channels. *See Kronz, column 4, lines 24-29.* Therefore, Applicant submits that Kronz does not cure the abovementioned deficiencies of Collins with respect to claim 17. Thus, Applicant submits that Collins in view of Kronz does not teach or suggest all the elements as recited in claim 17 and does not establish a proper *prima facie* case of obviousness.

Claims 18, 19, 21, 33, and 34 depend on claim 17 and are patentable over Collins in view of Kronz for the reasons stated above and additionally in view of the further elements recited in these dependent claims.

Applicant can not find in Collins a teaching or suggestion of a waveguide structure that has a bonding material with a capping surface disposed on top of a trench within a printed circuit board, where the capping surface is aligned over the trench, as recited in claim 22, as amended. Collins deals with micro-machining a waveguide that includes attaching a pre-sputtered lid to complete the waveguide. A pre-sputtered lid attached to a structure to form a waveguide does

not teach or suggest a waveguide structure having a bonding material on top of a trench, where the bonding material has a capping surface aligned over the trench to form the waveguide structure in a printed circuit board.

Further, Applicant can not find in Kronz a teaching or suggestion of a waveguide structure that has a bonding material with a capping surface disposed on top of a trench within a printed circuit board, where the capping surface is aligned over the trench as recited in amended claim 22. As noted above, Kronz appears to deal with a printed circuit board having an integral waveguide having a metallic plate that provides the top of the waveguide that is formed directly to the waveguide channels. *See Kronz, column 4, lines 24-29.* This metallic plate of Kronz does not appear to be part of a bonding material that is disposed over the channels of the Kronz waveguide. Therefore, Applicant submits that Kronz does not cure the abovementioned deficiencies of Collins with respect to claim 22. Thus, Applicant submits that Collins in view of Kronz does not teach or suggest all the elements as recited in claim 22 and does not establish a proper *prima facie* case of obviousness.

Claims 23-28 depend on claim 22 and are patentable over Collins in view of Kronz for the reasons stated above and additionally in view of the further elements recited in these dependent claims.

Applicant requests withdrawal of these rejections to claims 2, 8-19 and 21-34, and reconsideration and allowance of these claims.

AMENDMENT AND RESPONSE UNDER 37 CFR 1.116 – EXPEDITED PROCEDURE

Serial Number: 09/963637

Filing Date: September 27, 2001

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Assignee: Intel Corporation

Page 13

Dkt: 884.A23US1 (INTEL)

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612) 371-2157 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 13 day of October, 2003

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